Western Massachusetts Electric Company's
Report to the
Department of Telecommunications and Energy
on Summer 2001 Reliability and Service Quality
D.T.E. 01-66

I. EXECUTIVE SUMMARY

On August 10, 2001, the Department of Telecommunications and Energy ("Department") instructed Western Massachusetts Electric Company ("WMECO") to "undertake an examination of the underlying causes for the distribution outages experienced during Summer 2001, a diagnosis of any operation or physical problems in the distribution system, and a plan to reduce, or where feasible, eliminate the risk of recurrence." Subsequently, on August 24, 2001, the Department voted to open an investigation, D.T.E. 01-66, into these service quality issues.

WMECO was fortunate in the summer of 2001 in that it did not experience major outages related to overloading due to high summer temperatures. WMECO did see a number of small, scattered outages due to overloads of overhead distribution transformers during the heat wave that occurred from August 6 - 10. These outages were due to localized problems and thus did not indicate any major system failure. WMECO attributes this performance to a constant focus on operational and infrastructure improvements. Section II of this report provides a detailed description of WMECO's Summer 2001 experience.

Accurate load forecasting is an important step in system design. The WMECO load forecasting process is described in Section III. WMECO takes numerous other steps to prevent outages. WMECO relies on specific inspection and maintenance practices which are described in Section IV. Our broad-based inspection and maintenance practices include time-based inspection and maintenance of all major distribution equipment, visual and infrared circuit patrols and vegetation management.

While our inspection and maintenance practices are extensive they alone do not complete the WMECO efforts toward outage reduction. WMECO has several methods in place to identify and address design flaws within our electric distribution system as described in Section V. These efforts include the assignment of all circuits to designated "Circuit Owners", a daily review of all outages and electrical troubles, a System Operational Review Committee, a "5 or More" Tracking Process, an Equipment Failure Reporting System, a Decision Analysis Model and critiques of storm responses and mock storm drills.

Even though WMECO designs and maintains the distribution system to prevent outages from occurring, forces beyond our control do periodically disrupt our system. We recognize that early notification and preparation are key to responding to these disruptions. WMECO relies on several sources of weather forecasting as described in Section VI. Good weather data is essential in implementing our emergency plan and managing restoration efforts. Section VII describes the procedure and technology used to call in WMECO service restoration workers.

WMECO is expressly aware that simply doing a good job at outage restoration is not enough. It is crucial that our restoration efforts are communicated to municipalities, political leaders, regulators, and our customers. WMECO has several avenues in place to accomplish this task, which are detailed in Section VIII.

Outages on an electric distribution system can be of significant length and often require replacement material for repairs to be made. WMECO's philosophy on the use of emergency equipment is described in Section IX. WMECO's ability to obtain spare equipment is discussed in Section X. WMECO receives significant support from our parent company, Northeast Utilities ("NU"), in this regard.

To accomplish all of these critical tasks WMECO needs a well trained and properly staffed workforce. The training that is provided to our workforce is described in Section XI. A look at the WMECO staffing levels and a cost / benefit analysis of having dedicated inspection personnel are included in Sections XII and XIII, respectively.

While this report addresses the WMECO distribution system, a brief look at Transmission issues that affected WMECO is included in section XIV.

As stated above, while WMECO performance has been solid, the focus remains on operational and infrastructure improvements. Examples of these improvements include:

- **Load forecast process improvements (Section III. C)**
- **Inspection and maintenance process improvements (Section IV. H)**
- **Communication and notification process improvements (Section VIII. G)**
- **Spare equipment process improvement (Section X. F)**
- **Transmission system infrastructure improvements (Section XIV. B)**

WMECO has thoroughly examined its system and the methods used to keep it performing reliably. We expect that our on-going focus on operational process and infrastructure improvement will allow us to continue to provide reliable service.

II. WMECO PERFORMANCE DURING THE SUMMER OF 2001

A. Heat wave of August 6-10, 2001

WMECO, along with all of the other Massachusetts electric utilities, experienced record high loads due to several days of extreme heat during the heat wave of August 6 - 10, 2001. On August 8, ISO New England Forecasters predicted a peak load for August 9 of 24,925 MW based on forecast temperatures approaching 100 degrees with dew points in the 70s. On the morning of August 9, this forecast was revised to 25,200 MW. As it turned out, the August 9 actual peak load reached approximately 25,150 MW with actual temperatures in Boston and Hartford reaching 96 and 102 degrees with dew points of 70 and 66 degrees, respectively. This new peak load represents an 11.6% increase over the previous all-time peak of 22,544 MW set on July 6, 1999. The new peak exceeded the summer season's "projected" peak load exposure (23,650 MW) by over 1500 MW and even exceeded the summer's "extreme" load forecast (24,747 MW) by over 400 MW. The severe weather coupled with load growth, gave rise to this exceptional demand. The load for all of western Massachusetts, which represents approximately 4.7% of the New England load, peaked at 1182 MW. This exceeded the forecast by approximately 4%.

The heat wave of July 3 - 7, 1999 created the highest ever system electrical demand which at that time was thought to be a once in ten-year occurrence. The heat wave of August 6 - 10, 2001 proved this was not the case as the 1999 peak was exceeded by 11.6 % and a new all time high electric demand was recorded.

To meet these demands in August, 2001, ISO-NE issued an "abnormal conditions alert" to suspend work activities on the transmission system. ISO-NE also implemented a "capacity deficiency" procedure during the heat wave. WMECO, as part of the NU System, participated in daily conference calls to manage our demands, transmission loads, and take actions to ensure that our grid was not unduly exposed to risk by any single event. WMECO switched load from heavily loaded substations to adjacent substations to preserve enough reserve on individual transmission lines, as well as distribution substations. With these actions WMECO's transmission and distribution ("T&D") infrastructure performed well.

WMECO did experience the failure of a step-down transformer that affected 1,396 customers for 10 minutes while it was isolated and 111 customers for 467 minutes while it was replaced. The step down transformer failed in the evening and WMECO replaced it with a unit from NU's Berlin Central Warehouse located in Berlin, Connecticut. The failure also required the clean up of an oil spill that added to the duration of the outage.

The other failures on the WMECO system that did take place during August 6-10 were predominately due to overhead transformers. WMECO replaced 49

transformers and reset 50 transformers during the August 6-10 period. In comparison, WMECO replaced 47 transformers and reset 59 transformers during the heat wave of 1999. WMECO had 2 overloaded cutouts in both the 2001 and 1999 heat waves. A listing of outages for the period of August 6-10 was provided to the Department on August 15, 2001 and is included as Appendix I to this report.

Fortunately, WMECO and its parent company, NU, learned some lessons in July 1999 that aided in its response in August 2001. After the overhead transformer shortage that affected all New England utilities in July 1999, NU increased the number of overhead transformers that are kept in inventory during the summer months. This increased inventory was critical to having enough transformers available to replace those overloaded transformers that would not reset when placed on overload. When a transformer's secondary breaker trips due to overload, the breaker can be placed in the "overload" position, which allows the transformer to carry approximately 10 percent more load than the "normal" setting.

WMECO also learned from July 1999 the pattern of failure of overhead transformers during a heat wave. The majority of failures occur in the early evening due to a combination of the build up of residential load at this time and the cumulative effect of heating due to load cycle. This knowledge prompted WMECO to implement day and night line crew shifts of 12 hours. This twenty-four hour coverage helped to reduce outage times.

A comparison of WMECO's SAIDI and CAIDI for the July 3 - 7, 1999 heat wave and August 6 - 10, 2001 heat wave indicates that improvements have been made in WMECO's ability to respond to simple transformer replacements and resets. While the number of simple transformers that were replaced or reset were relatively close (106 for 1999 and 99 for 2001), SAIDI and CAIDI for this type of event for 2001 were improved from 1999. For 1999, SAIDI was 0.909 and CAIDI was 237.7. For 2001, SAIDI was 0.905 and CAIDI was 196.9. In addition the average response time to simple transformer events improved from 237 minutes in 1999 to 188 minutes in 2001. The SAIFI values were 0.0038 for 1999 and 0.0046 for 2001. SAIFI was slightly higher because more customers were affected per trouble spot in 2001. Total customers affected by simple transformers was 797 in 1999 and 967 in 2001.

The simple transformer overloads experienced in August were single location transformers serving small pockets of residential customers. In many cases these transformers had been installed many years earlier. As time passed from the initial installation to the present, the load in the houses the transformers served increased, causing transformers that were partially loaded initially to become fully loaded. During normal circumstances this would not pose a problem. However, a heat wave is not a normal circumstance. During a heat wave individuals who normally would not run their air conditioners extensively, operate them in the morning when they go to work and run them all night long. This practice causes the transformer to be loaded around the clock and does not allow for the transformer cooling that normally occurs during the overnight hours. This

continuous heating of the transformer leads to either the tripping of the secondary breaker or a failure of the transformer. Another contributing factor to the transformer loading is that during the second or third day of a heat wave many people that have not felt the need for an air conditioner go out and buy one. These additional air conditioners contribute to the loading of the transformers and can be the breaking point that causes the transformer to fail or trip out.

It should also be noted that there was a period of thunder and lightning at the end of the 2001 heat wave on August 10, 2001 that caused some tree and lightning related outages.

B. Remainder of Summer 2001

WMECO did not experience any other significant outages due to equipment overloads during the balance of the summer of 2001.

In an attempt to evaluate our performance during the summer of 2001, WMECO chose to compare SAIDI and CAIDI with storms for July, 1999 and August, 2001. These two months were chosen for their weather similarity. Both July, 1999 and August, 2001 had a heat wave and thunder and lightning storms. July, 1999 had one minor storm day and 2 major storm days. August, 2001 had one minor storm day and three major storm days. Including this storm data, the comparison is:

WMECO's SAIDI and CAIDI for July, 1999 were 14.04 and 166.13, respectively.

WMECO's SAIDI and CAIDI for August, 2001 were 10.39 and 100.45, respectively.

III. ADEQUACY OF LOAD GROWTH FORECASTING

A. Load Forecasting Process

WMECO's organization includes a dedicated Asset Management group consisting of a centralized engineering analysis group and field-located Circuit Owners, who are responsible for the circuits in their designated geographic area. The Asset Management group uses monthly peak readings for all WMECO substations and circuits and input from WMECO Account Executives on anticipated major load additions to develop a load forecast for all substations and circuits. The load forecasts include both the summer and winter peak periods. The peak loads for the substation and each individual circuit from the previous summer and winter are used. Based on historical loads, WMECO uses a load growth factor of 1% per year in our analysis. The WMECO load forecast projects substation and circuit loads for a period of seven years.

The WMECO load forecast is done for each WMECO substation. The loading limitations of the substation transformers and of the individual circuits supplied by the substation are included on the load forecast sheet. The load forecast

process compares the forecast load for each of the next seven years against these limits. If the load forecast shows the limits are projected to be exceeded, options to alleviate the overload condition are developed and implemented as needed.

In addition to looking at the forecast load on each circuit under normal conditions, contingencies are reviewed. For example, if a circuit has an automatic recloser loop scheme, the amount of load that would automatically be transferred to the circuit is added to the forecast peak for the circuit and the combined load is compared to the loading limit.

B. Load Forecast Results

WMECO uses the results of the load forecast to design and construct appropriate infrastructure improvements. A list of actions that WMECO has taken since 1998 as a result of our formal load forecasting process is included in Appendix II.

C. Load Forecasting Process Improvements

WMECO constantly reviews its load forecasting process for areas of improvement. A recent review of WMECO's load forecasting process has brought three improvements to our attention.

The first improvement is the period of time the forecast looks into the future. WMECO feels that a ten-year look will be of more value than a seven-year look, and we will begin ten-year load forecasts.

The second improvement involves the peak load that is used in the forecasting process. WMECO presently includes three years of historical peak data in our load forecasts and has been using the previous year's peak load to do the forecasting. The summer of 1999 peak was thought to be a once in ten year occurrence. When WMECO did the load forecasting for 2001, the peak load data from 2000 was used. The summer peak of 2001 that exceeded the 1999 summer peak showed that using the previous year's peak load data was not the best choice. In the future, the WMECO load forecasting process will utilize five years of historical peak data. The highest peak in the past five years will be used as the starting point for the forecasting process.

The third improvement is a new load forecasting tool WMECO expects to acquire by the end of 2002. NU is developing a load forecasting program that is called the Load Estimating Analysis Program ("LEAP"). The LEAP program is a planning analysis tool that will give the WMECO Asset Management Group the ability to create zones of customers on a circuit. Once these zones are established, various contingency switching operations can be analyzed. The program will have the ability to input zone limiting factors and based on those limiting factors, load projections will be run to determine when these limiting factors will be exceeded over a forecasted period of time. This will aid to:

- ?? **Forecast substation and circuit loading projections with identification of overloads over a 10-year period.**
- ?? **Provide annual reports of high load devices (fuses, switches, etc.) that are within 90% of their ratings.**
- ?? **Provide annual reports of loading on step transformers.**

IV. INSPECTION & MAINTENANCE PRACTICES

A. Inspection & Maintenance Program

WMECO follows the NU Inspection and Maintenance Program that is detailed in the "NORTHEAST UTILITIES MAINTENANCE PROGRAM ("NUMP") PREVENTATIVE MAINTENANCE MANUAL." A copy of this manual is attached as Appendix III.

The philosophy behind the manual is that a public utility is responsible to provide safe, reliable and economical service to its customers. Recognizing this commitment, a preventative maintenance program has been developed on a NU System basis designed to properly meet our present and future responsibilities. The program and this manual, which details the CHECK, INSPECTION, TEST and MAJOR MAINTENANCE requirements, was developed by and represents the combined efforts of all the NU Operating Companies. The main objectives of this program, both in creation and implementation, are to:

1. **Prevent interruptions**
2. **Extend the useful life of our apparatus**
3. **Provide a continuous appraisal of our equipment status.**
4. **Reduce maintenance costs.**
5. **Train our personnel in the area of equipment maintenance.**

The Preventative Maintenance Manual encompasses most of the electrical apparatus used on our transmission and distribution systems. The standards as presented are intended to serve as a basis for a uniform system program. It is expected that equipment operating beyond its normal life expectancy, or in an unusually severe environment, or subjected to abnormal operating duty will be given special consideration. Some equipment by virtue of its own operating history, diagnostic tests, and the performance of like equipment may allow for extension of its major maintenance requirement.

In addition, it must be recognized that although this manual indicates what must be done, the actual details of how it is to be accomplished is obtained from each manufacturer's instruction book for each specific manufacturer's type. The manual is sectioned by equipment, with each equipment section divided into the following maintenance categories:

1. CHECK - Energized station or routine check
2. INSPECTION - Energized periodic Inspection
3. TEST - De-energized Test and Inspection
4. MAJOR MAINTENANCE - De-energized Inspection, Test and Maintenance

The concept of energized CHECK and INSPECTION and de-energized TEST is an important aspect of the entire program and illustrates a maintenance philosophy of evaluating the condition of equipment without its being disassembled. Utilizing this philosophy, major maintenance cycles may be lengthened and a more continuous appraisal of our equipment status can be derived. There are continuing efforts to review maintenance results and equipment failure reports to evaluate the need to modify maintenance procedures and frequencies.

This program has been designed to derive optimum performance from both our equipment and people.

B. Equipment Covered in NUMP Manual

The NUMP Manual covers the inspection and maintenance of the following equipment: circuit breakers, transformers, regulators, reclosers, sectionalizers, disconnect switches, capacitors, and other miscellaneous equipment.

C. Status of Inspection and Maintenance Program

WMECO has been following the guidelines for equipment maintenance in the NUMP manual and for calendar-year 2000 and calendar-year 2001 to date has completed all of the required inspection and maintenance work.

D. Pole Inspections

WMECO performs annual pole inspections. The areas are chosen based on age and patrol information from our Asset Management Group. The areas where the poles are inspected are the ones believed to be in the worst condition. WMECO prioritizes and completes repairs as needed based on the results of the inspections.

WMECO has poles that are joint with the telephone company that are within the telephone company maintenance area. The telephone company is responsible for inspecting these poles. The condition of many of these poles appears to be deteriorating and WMECO has requested that the telephone company replace the poles that appear to be in the worst condition. The poles in these areas are at a higher risk as we have no direct control over their inspections and replacement.

E. Circuit Patrols

All of WMECO's overhead distribution circuits are patrolled quarterly by our Asset Management Group. One of these patrols is a full circuit patrol and the other three are backbone patrols. In addition to these scheduled patrols, after storms WMECO attempts to patrol any circuit that has seen major storm interruptions.

These patrols help to avoid outages on our overhead lines by identifying problems before a fault occurs. Typical items found are tree problems, limbs on the line, open capacitor bank fuses, blown lightning arresters, broken guy wires, etc. Once a problem is found, the need to make corrections is prioritized and repairs are scheduled with the overhead line department that covers the area in which the problem was found.

In addition to the patrols of our distribution lines, the 115kV and 345kV transmission right-of-ways are patrolled annually by WMECO's Overhead Line Department. WMECO's Overhead Line Department also patrols right-of-way portions of 17 distribution circuits where the terrain is extremely rough with all terrain vehicles on an annual basis. Any problems found are prioritized and fixed accordingly.

F. Infrared Patrols

WMECO performs infrared patrols on all circuit backbones (from the substation out to the first set of fuses) on an annual basis. This type of patrol is used to find equipment that is in the process of failing. The most common finds are loose connections. The items that are found to need repair are fixed based on the amount of temperature rise over ambient based on the following guidelines:

Class		Temp. Rise	Response	Comments
1)	Minor	1 - 10 deg C	Routine	Repair next regular maintenance
2)	Alert	10 - 25 deg C	2 - 4 weeks	Repair in near future, monitor load
3)	Serious	25 - 45 deg C	1 - 2 weeks	Repair immediate future, inspect for damage
4)	Critical	45 - 75 deg C	1 - 6 days	Repair immediately, replace components
5)	Emergency	> 75 deg C	Immediate	Repair immediately

In addition to the annual patrols, special infrared patrols and inspections are done at the request of the Asset Management Group for issues such as circuit loading changes and on circuits where downstream faults may have stressed upstream equipment.

G. Vegetation Management Program

WMECO circuit backbones are trimmed on a five-to-six-year cycle. Lateral trimming is scheduled based on reliability, not on a fixed cycle. A Decision Analysis ("DA") Model (computer program discussed in Section V.E. - Distribution System Design Review) supplies information on customer-minutes lost due to trees. This information is used in the development of the tree-trimming schedule. In addition to the results from the DA Model, practical knowledge from

the WMECO Arborists and our Asset Management Group is used to determine where trimming should be done. The Asset Management Group currently patrols the backbones of overhead distribution circuits on a quarterly basis with one of the four patrols including all side taps as well. In 2001, based on scheduled trimming mileage, WMECO was on an effective 5.4-year cycle.

The DA Model will be used to help develop the 2002 trim list for backbone and lateral trimming. Since the DA Model uses actual tree outage information in its calculations, the amount of trimming done each year varies somewhat. Along with the scheduled trimming, WMECO handles tree problems that arise on a daily basis.

WMECO also has an innovative "Town Mower" program that provides for leased brush-mowers to be shared by a number of towns as a team. This program currently has six mowers in operation and approximately 30 of the 59 communities served by WMECO participating. In each group, towns share a mower leased by a "lead town." The mower is used to clear roadside brush in each town. Annually, WMECO pays the leasing cost. In return, the towns agree to also mow brush beneath WMECO roadside lines. Both parties benefit from the brush cutting, and the need for herbicides is eliminated.

H. Inspection and Maintenance Process Improvements

Inspections are one of the critical and high priority items for WMECO as we switch from a time-based maintenance program ("NUMP") to a Reliability Centered Maintenance ("RCM") program that will rely on the use of a Computerized Maintenance Management System ("CMMS") utilizing a program called "CASCADE" and associated hardware that is scheduled to be operational by January 2002.

CASCADE is a computer program that provides a comprehensive equipment nameplate database, plus tracks and schedules routine inspections, tests, and servicing of equipment for substation and transmission facility maintenance. The CASCADE program is inspection based and will determine when maintenance is required based on inspection and test data. The information in the NUMP manual has been utilized in the determination of what should trigger maintenance in the CASCADE Program.

Our Electrical Maintenance Department is currently making the transition to RCM. Our Overhead and Underground Line Departments are looking at RCM as the next major improvement that they can make in this area. The full transition to RCM is expected to take some time.

V. DISTRIBUTION SYSTEM DESIGN REVIEW

A. Review of Daily Outages and Troubles

WMECO's Asset Management group investigates all outages and electrical troubles on a daily basis. All WMECO circuits have an individual Circuit Owner assigned to them to perform this task. This process helps to identify any additional work needed beyond the immediate repair, and makes changes to prevent any repeat occurrences.

B. System Operational Review Committee

WMECO has a monthly meeting of our System Operational Review Committee ("SORC"). This committee is made up of all of the individuals with lead roles in WMECO's Operations and Engineering Groups. This committee discusses all the details surrounding any major outages that occurred in the previous month. The purpose of the discussion is to ensure that action has been taken to prevent a recurrence of the events.

In addition to the WMECO issues, SORC reports from the other NU operating companies, Connecticut Light and Power ("CL&P") and Public Service Company of New Hampshire ("PSNH"), are reviewed to determine if there are any items that can be applied to WMECO.

C. "5 or More" Tracking Process

WMECO has an automated process that will identify any protective devices that have had five or more operations in the past three months and/or past twelve months. This process runs monthly and sends notification to the Circuit Owner so corrective action can be taken.

D. Equipment Failure Reporting System

The Equipment Failure Reporting System ("EFRS") is used to collect and analyze all reports of equipment failures, especially those which result in outages. The data is collected from all of the NU operating companies, WMECO, CL&P, and PSNH.

The equipment failure reporting system is connected to the Trouble Call Interruption Analysis System ("TCIAS"), and any interruption which is identified as caused by equipment failure is automatically entered into the EFRS for follow-up analysis. Equipment failure reports are also entered for equipment which fails even if an outage does not occur, or if incoming inspections identify defective equipment. The main goal of the EFRS is to identify equipment and material where the failure rates are increasing so appropriate action can be taken to address the problem.

Using the data in the EFRS, annual reports of the worst performing equipment are generated to develop remedial action to mitigate the frequency and duration of future failures. The 2000 worst performing equipment report is included as Appendix IV. The report lists the items found to be the five worst performers for overhead, direct buried, and underground equipment. It describes the problems with each, current solutions, and future actions to be taken.

E. Decision Analysis Model

The Decision Analysis model is a tool used by WMECO to aid in the development of the workplan for reliability-based work. The DA model was built in 1999 with the assistance of a consulting firm. Over a six-month period, the development team analyzed historical outage data and gathered particular system data to build the DA model. The model is designed to be used to predict SAIFI (System Average Interruption Frequency Index) based on miles of line in specific condition states. The model has two main components: a macro level component and a micro level component.

At the macro level, the model determines the level of work by reliability program necessary to reach a specific SAIFI and SAIDI trend. The reliability programs modeled include: Vegetation Management, Lightning, Animals, Pole Tops, DB Cable, Substation (animal protection and recloser maintenance) and Sectionalizing. Within each of these programs, the distribution system is divided into condition states and miles of line in each condition state is assigned. A condition state represents various attributes which have a specific failure rate per mile assigned (determined based on historical data and industry analysis) and directly impact the specific outage cause being analyzed (e.g., Trees, Animals, etc.). Sample condition states for the vegetation macro model include year since last trimmed, bare or covered wire, voltage class, etc. Once miles of line per condition state is gathered, they are multiplied by the assigned failure rate for that condition state. This results in a predicted number of interruptions by cause. The model sums up all of the modeled outage causes and allows the user to move miles of line from one condition state to another, thus changing the failure rates of those miles of line resulting in a reduced number of predicted outages. The macro level output is summarized into miles of line to change condition state (by reliability program) in order to achieve a desired performance outcome. This can be done for a single year or for multiple years.

At the micro level, results developed in the macro model (miles of line to remediate by reliability program) are entered into a program that determines the best circuits or circuits segments to apply the reliability programs to. For example, if the model suggests three miles of tree trimming, the micro model determines which circuits to trim such that the total miles is three.

The DA model is updated and re-calibrated annually by the NU Asset Strategy Group. Feedback is obtained from engineering groups within WMECO (Asset Management Group) to update the data in the model, along with data from the

outage management system (TCIAS). Updates are completed in early January so that scenario development can take place in the first quarter each year. WMECO selects the scenario that best fits its goals and business plan, and then a draft workplan for the following year's work is derived by the micro model. The draft workplan is used as a guide in conjunction with the practical knowledge of the Asset Management Group to determine what work should be done.

In addition, WMECO uses the DA model to analyze and verify decisions regarding reliability improvements as they impact the overall distribution system performance. Changes and enhancements in reliability programs can be entered into the model and a predicted outcome is produced. This information is used along with other local data to make high level planning decisions.

F. Storm Critiques

Storm Critiques are conducted after major events to measure the effectiveness of WMECO's restoration, "cut and clear" (make safe), and phases of restoration. A survey is sent to public officials in towns affected by the event to obtain their feedback on WMECO's efforts. Questions such as: "What went well? What went poorly? What needs improvement? Suggestions?" are asked and the responses are collated for evaluation. Follow-up by WMECO's Emergency Response Administrator ("ERA") and District General Managers ("GMs") is essential to gaining detailed information on any issues cited by communities. The survey is the first step in evaluating WMECO's performance during each event. Ongoing training initiatives conducted by WMECO safety and ERA personnel help to identify other issues which need to be addressed along with issues from the general survey. Personal contact provides the most accurate and meaningful feedback on towns' evaluation of performance. Surveys also provide opportunity for communities to say what went well and to praise WMECO crews for their work during events. This information is passed along to the crews and individuals noted in the towns responses. The survey is intended to be, and is, a communication tool utilized for improvement of service delivery by WMECO.

Additionally, WMECO provides a survey to its own employees after each event to obtain employees' personal perspective of what went well? Poorly? Needs improvement? Suggestions? This survey provides the basis for more formal face-to-face critiques with employees to discuss issues presented in the survey. The value of the employee survey and subsequent critique are reflected in the many emergency plan company procedures reviewed, changed, and modified as a result. There is no better litmus test of how well WMECO serves its customers, particularly during a crises event, than to ask them and then, to ask the individuals (employees) who performed the work to perform an evaluation from their perspective. Once both surveys are complete the results are compared.

G. Mock Storm Critiques

Mock storms are conducted annually in each WMECO District and critiqued with employees. The ERA and Manager of System Operations Center ("SOC"), using computer software, design a mock storm for each individual District to test and evaluate the District personnel's readiness for emergency work. From these mock events, followed by face-to-face critiques, modifications are made to WMECO's restoration procedures and processes as they relate to each particular District and their specific circumstances.

The emergency operations center in each District is constructed differently due to building design. These mock events provide local personnel the opportunity to design their own emergency operations center to work most efficiently and effectively.

Also, mock storms provide local District personnel the opportunity to practice skills they may not use on a regular basis. This in turn identifies training needs both remedial for those employees regularly involved in a particular assignment and, new training for individuals newly assigned to a particular role. A list of comments, suggestions, problems encountered during the mock event is kept by the ERA for continued surveillance. The list is used by WMECO management to insure any plans for modification, correction, training are in fact being implemented.

VI. WEATHER FORECASTING

A. Weather Forecasting Services

NU contracts for a weather service tailored to the Massachusetts, Connecticut and New Hampshire service territories. In real time, data on weather systems is available to emergency personnel at WMECO. The data includes precipitation type and quantity, storm intensity, wind and lightning which are the major factors for outage causation. WMECO also monitors the Weather Channel as well as obtaining weather forecasts from the National Weather Service.

B. Accuracy of Weather Forecasting

The real-time weather systems data is excellent and a very useful tool in implementing storm preparations. In fact, WMECO uses the real-time lightning tracking, which defines storm cell movements via the timed, color-coded strikes (within last 60, 30 and 15 minutes), on a regular basis. Based on this information, WMECO places crews on-call and/or holds crews at the Area Work Centers to ensure timely response to events. On both the evening of Friday, August 3 and August 10, crews were held and responded to localized outages. It is important to note WMECO realizes weather forecasting is not an exact science and uses the forecast data very conservatively when defining staffing for restoration assignments. WMECO sometimes may in fact hold crews, and then experience no outages.

VII. PERSONNEL AVAILABILITY, CALL OUT AND DEPLOYMENT

A. Automatic Call Out System

WMECO utilizes an Automated Call Out System to call in additional workers to respond to outages. Calls are made to employees from the District that has the outage first. If a "local" employee is not available, calls are made to employees from other Districts. The system software maintains current employee contact data, and when resources are needed the software calls the employee's home. The employee then responds via telephone touch tones whether or not they can respond to work. Utilizing this software allows simultaneous calls so call outs are completed faster. This allows our Dispatchers to focus on restoration switching and direction of crews.

B. Pagers

All WMECO lineworkers, splicers, electricians, supervision and other operations support personnel have been issued pagers with alpha-numeric capabilities. Personnel assigned pagers are not required to wear them after hours unless they are on call, but most individuals do wear their pagers after hours.

Our pagers enhance WMECO's ability to contact employees that may be away from their home telephone. This capability enhances our ability to reach all employees during both a storm event, as well as during minor troubles on weekends for example. This capability has allowed for a quicker restoration of service for isolated District outages by reaching local lineworkers and avoiding the need to send crews from another District.

C. On Call

WMECO has a Supervisor on call in each District for overhead and underground lines as well as a Troubleshooter Lineworker. In addition, WMECO has a Supervisor on call for Substation and Test issues throughout the WMECO territory.

WMECO supplements this on-call group when weather forecasts indicate conditions which may cause multiple outages. The number of additional resources on call is adjusted according to the severity of the weather forecast. During holiday time periods when employee call outs may not yield enough resources, additional personnel are placed on call. Once crews are placed on call, the crews have a contractual obligation to respond within a prescribed period of time. This proactive measure enhances response times and ensures resource availability during times of high demand and/or limited resources.

D. Call out response levels

WMECO has a 100% success rate at getting someone to respond when a call out is initiated. However, the individual(s) responding are from the local District about 75% of the time and from a neighboring District about 25% of the time. Approximately 25% of our workforce responds more than 25% of the time WMECO calls their homes. WMECO finds the current callout performance levels an area of concern in our smaller Districts where the number of people available to call is less than in our largest District. WMECO is working to continue to provide incentives to improve callout performance as well as provide shifts and on call to enable assured 24X7 coverage.

E. Support from CL&P, PSNH, and NUSCO

WMECO calls upon resources throughout the NU family in times of need. Trained Line Patrollers, personnel to stand by downed wires, lineworkers, splicers, electricians, supervision, storeroom, vehicle mechanics etc. are available resources that WMECO can utilize during emergency events. These other resources from CL&P, PSNH and our NU corporate office are trained and ready to respond.

F. Mutual Aid from Other Utilities

WMECO is part of the Northeast Utilities System. Northeast Utilities belongs to Edison Electric Institute ("EEI") Mutual Assistance Roster for Distribution and Transmission Assistance, this roster is made up of eighty (80) utilities throughout the United States. This roster provides mutual assistance general guidelines and suggested governing principles covering emergency assistance arrangements. The roster contains information regarding, contacts names and telephone numbers, numbers of crews, types of equipment, types of work that the crews can perform.

WMECO typically calls the utilities that are not effected by the storm and are closest to WMECO. This reduces the travel time and aids in reducing the restoration time.

If the problem is widespread across New England, the limiting factors are how many companies are calling for help and the distance to obtain crews. In other words, it would not make sense to call for crews from a distant utility if the restoration work would be winding down by the time they could arrive to help.

VIII. COMMUNICATION AND NOTIFICATION PROCEDURES

A. WMECO Emergency Plan

Annual updates to WMECO's Emergency Plan are delivered by September 1 to the Department, Massachusetts Emergency Management Agency ("MEMA") and each community served by WMECO (the most recent copy was filed with the Department on September 1, 2001). Plans are updated to reflect information received from communities during regular meetings held with public officials and their emergency personnel. Each District in WMECO hosts a separate meeting for public officials from each of the towns served by a particular District. Ongoing meetings, usually with WMECO GMs and ERA attending, are held with individual communities' Selectmen for those towns unable to attend larger meetings.

B. Town Priorities

Each community is annually provided with WMECO's list of priority customers as part of the Emergency Plan updating process. Town officials are requested to review and update the list to reflect any new information. Questions are asked, such as; Is the list accurate? Are there facilities closed and no longer in town since last review? Are there new listings? Are there any special populations previously overlooked? Any facility or business that the towns consider priority is encouraged to be placed on the list. Finally, WMECO makes sure it has correct contact information for each of the listed priorities. Follow-up meetings include not only opportunity to update information contained in the plan about each community, but also provide opportunity for WMECO officials to review plans and explain operational goals and strategies of WMECO, and any changes WMECO has made to strengthen the plan. Additionally, public officials not only provide information during these meetings, they also provide input as to their towns' needs and any problems they may have experienced working with WMECO and any changes they feel would improve the plan.

C. Communication with Town Officials

Updates of plans include contact telephone and fax numbers for each community's officials and an update of each community's list of officials. Additionally, WMECO, as a result of a suggestion of a local Emergency Manager at one of the public officials meetings, has arranged to "blast fax" information concerning capacity issues to local 911 call centers. In turn, individual communities may request their centers to disseminate the information through their normal emergency notification process. These centers then can individually alert each community's emergency agencies or officials in order for those agencies to implement any local preparatory measures they deem necessary.

D. Damage Assessment Training

This training focuses on local emergency personnel, and teaches them to recognize and report damage to WMECO facilities, while at the same time protecting themselves. The training consists of several hours of slides, video, live demonstrations, and discussion, combined with a booklet containing actual pictures of WMECO electric equipment. This allows local emergency personnel (Police, Fire, DPW, Emergency Management) to be able to report to WMECO, via a special "800" telephone number, using a simple report form, any damage encountered in the reporting party's community. This assessment technique, partnering with local emergency personnel, enables WMECO to more rapidly evaluate and quantify damage in each town. With good early damage assessment WMECO is able to call for needed resources and have them staged for deployment once WMECO moves into the full restoration phase.

Prior to our full restoration phase, WMECO personnel are engaged in the "Make Safe" and "Cut and Clear" phase of storm response, while working with public officials who are reporting electrically hazardous conditions. Our clearing of lines and making safe assists communities with regaining control of the streets and highways in their individual towns in order to provide crucial local services i.e., ambulance, police and fire. This also enables DPW crews to plow or clear debris from roads for fuel trucks to make deliveries, as well as, enables local emergency personnel and public officials to check on any special populations in the community, such as elderly housing, special needs groups, hospitals, etc. Essentially this techniques enables individual towns to regain control of their community to provide these essential services, while arrangements are being systematically made for full scale restoration.

E. Communication with Department and MEMA

During any event causing numerous electrical outages and multitown damage to WMECO's electrical system, the ERA establishes contact with MEMA Headquarters in Belchertown (Area III Headquarters), Framingham and the Department, as required. WMECO has in place direct radio contact between WMECO's Emergency Operations Center in West Springfield and MEMA's Headquarters in Framingham. This radio is for extreme emergency use only, such as in the instance of catastrophic collapse of commercial telephone systems. This radio link also provides some communication capabilities with WMECO's service territory towns as well. Each 911 call center has capability to communicate with MEMA at MEMA's Area III Headquarters in Belchertown.

F. Local Outage Events

Local outages are tracked and managed via the Trouble Call and Interruption Analysis System, operated by the System Operations Center. TCIAS accesses customer information from the Customer Service ("CS") System for incoming

calls and outage management. Dispatchers in the SOC input information (i.e., response, restoration projections, customer count affected, cause of outage, times, etc.) into TCIAS. Restoration projections trigger area or circuit specific outage restoration information that is then available to CS representatives or the Voice Response Unit ("VRU"). Should a CS representative or the VRU not have the requested information, the Dispatch Center is contacted as needed. In addition, General Managers and Account Executives are alerted to predetermined, specific outages such as large industrial customers, large areas affected, significant impact on public safety infrastructure, etc. The District GM and/or an Account Executive will then make all of the necessary customer contacts to assist with outage management and communications.

Customers and municipalities may also access information about widespread local outages through WMECO's website, where the "Town Outage Report" is posted. The Town Outage Report currently lists the town, number of customers served, percentage of the town that is out, and the number of customers in the town that are out.

Prior to September 1, 2001, outages or events that required specific regulatory and municipal notifications were made by the SOC or District Management. WMECO now reports any outage over 500 customers, over 500 customer hours, and any critical customer outage to the DTE within 30 minutes. WMECO updates these outage reports every half hour until resolved on the Department's website as required in the Outage Reporting Protocol ("ORP"). All municipalities have been queried as to their wishes with respect to notification of outages. Based on these responses, WMECO provides outage information to designated municipal officials by fax.

G. Communications and Notification Process Improvements

In the future, WMECO will also have outage information available from our Electronic Dispatch System. This information will be available on WMECO's website and will contain more detailed information than the current Town Outage Report available today.

IX. USE OF EMERGENCY EQUIPMENT

A. Restoration Philosophy

A cornerstone of WMECO's restoration philosophy is to design our system so that restoration of service can be accomplished quickly and easily.

On our overhead ("OH") distribution system, WMECO utilizes automatic means of fault isolation and service restoration where practical. WMECO has installed automatic loop schemes with pole mounted reclosers on many of our circuits to allow for the quick and automatic isolation of the faulted portion of a circuit followed by automatic restoration of service to all customers that are not in the

faulted portion the circuit. WMECO has also recently started installing Supervisory Control and Data Acquisition ("SCADA") controlled switches that can be remotely operated to isolate faults and restore service on circuits that are in remote areas. Manually operated three phase disconnect switches are installed on all of our circuits at specific points to allow for easy isolation of faults and quick restoration. WMECO also relies on fuse protection to help minimize the number of customers affected by faults.

Our direct buried distribution ("DB") system is less prone to weather-related failures as the cables and equipment are more protected. The cables, or in some cases cables in conduit, are buried in the ground and the transformers and switching points are enclosed in metal or fiberglass cabinets. This protection eliminates the exposure to most weather-related problems. However, while identifying which portion of our DB system has failed and isolating it can be done rather quickly, making repairs on DB systems takes more time. For this reason, WMECO creates loops which have alternate supplies at each end wherever practical and possible. WMECO utilizes fault indicators within our loop systems to aid in the fault locating process. The transformers in these loop systems are connected with loadbreak elbows to allow for quick isolation of the faulted portion of the system. WMECO does have some older DB areas where the connections on the transformers are not loadbreak and must be switched and de-energized.

Our underground ("UG") distribution system is the most protected from outside forces because the cables in our UG system are installed in a duct and manhole system. The duct and manhole system consists of concrete manholes (below grade vaults) connected by runs of concrete-encased duct bank. The transformers and switching points are enclosed the same as the DB system. The concrete encasement adds an extra level of protection to the UG system over the DB system. However, problems within our UG system are very difficult to find and repairs are lengthy. For this reason, WMECO design standards for UG areas require two supply circuits to each customer or group of customers if a loop system is used. The switching operation is typically manual as the frequency of problems on our UG system is much less than on our OH system. WMECO does have some older areas where our UG system is radial and two supply circuits are not available. These areas are being rebuilt as part of a 20-year plan to the present design standards. WMECO is roughly halfway through this plan.

It should be noted that all of the major buildings in our cities have a minimum of two supply circuits or are supplied by transformers from loop systems with a minimum of two supply circuits.

In the downtown portions of Greenfield, Pittsfield, and Springfield, WMECO has a UG low voltage network system. The UG network systems provide our highest level of reliability as they consist of a number of transformers that are supplied by several different supply circuits with the secondaries banked together. The secondary system maintains service if there is a fault on any one of the supply

circuits. The network system is used to supply small to medium size loads in these cities.

Regardless of the type of area being served, WMECO's philosophy for restoration of service to customers located in the faulted portion of a circuit that cannot be restored through switching, is to make permanent repairs or deploy temporary lines and cables. Because of this, WMECO does not own any generators to be used for power restoration. Municipal critical service customers are identified by our Town officials in WMECO's Emergency Plan. WMECO works with Town officials to prioritize restoration activities to these facilities. In cases where we have prolonged interruptions or anticipate prolonged interruptions, we install temporary lines and cables to restore service while permanent repairs are made to our infrastructure.

In most cases our critical customers have their own installed emergency generation that is used to provide backup service in the event of an outage.

B. Mobile Transformers

It is WMECO policy to install mobile transformers for the sustained loss of a substation transformer that cannot be backed up by other permanently installed transformers at the substation. The policy is for the mobile transformer to be installed within 24 hours.

WMECO has access to mobile transformers that are reserved for use within the NU system. There are 14 mobile transformers ranging in size from 3MVA to 30MVA that are maintained for use within the NU system. A listing is included as Appendix V. WMECO has a long standing procedure that details a uniform method of requesting, scheduling, transporting, installing, returning, storing and maintaining the mobile transformers.

X. SPARE EQUIPMENT

A. Mobile Transformers

As mentioned in Section IX. B., WMECO has access to the 14 mobile transformers that are reserved for use by the NU system.

B. Spare S/S Equipment

All major spare equipment for the substation group is in the Transmission and Distribution maintenance group parts storage in Berlin, Connecticut, a relatively short distance from the WMECO service territory. Over 15 years ago the spare parts for substations were consolidated in one location for CL&P and WMECO to reduce overall inventory and costs associated with multiple storerooms. The requirement for spares in the substation area is not high and with the

consolidation better inventory is maintained with a much lower total number of parts. The dollar value of this inventory is approximately $7 million.

The items in stock range from fittings for existing equipment to bushings for all types of transformers and breakers (all manufacturers, voltage classes, and styles). WMECO also has tap-changer parts and full replacement kits for the contacts in all major brands of tap changers on the system. The quantity varies based on system usage and criticality of the units being stocked. The consolidated inventory has successfully met WMECO's needs for spare parts over the past 15 years.

C. Emergency Distribution Stock

WMECO maintains a level of emergency stock in each of its Districts to handle normal emergency needs. In the event of a major emergency WMECO relies on the support of the NU Berlin Central Warehouse ("BCW").

D. Support from NU

The BCW has a large emergency stock of material that is available for use by WMECO. The total dollar value of the emergency material housed at the BCW is approximately $3.2 million. This stock includes items that would be needed in the event of any type of emergency (i.e., heat wave, hurricane, etc). In addition to the declared emergency stock, NU increases the number of overhead transformers at the BCW during the summer to better handle heat waves.

During the August 6 - 10, 2001 heat wave, a physical inventory of overhead transformers was performed daily at the BCW and throughout WMECO and NU to insure that NU would not run out of transformers. WMECO was informed of the inventory status daily during the heat wave.

The BCW has six dedicated full time tractor trailer drivers that are used to deliver materials during emergencies. In addition, to these six drivers, two stockhandlers are trained to operate the crane and delivery van. The BCW fleet consists of six tractors, eight box trailers, two flat beds, one crane truck and two vans.

E. Vendor Support

In addition to the emergency material stored at the BCW, Graybar (an NU vendor) maintains approximately $75,000 worth of emergency material for NU. Graybar's emergency inventory consists mainly of smaller items, such as connectors. Graybar will make deliveries as required during emergencies.

F. Spare Equipment Process Improvements

Howard Industries and NU Materials Management have developed a program through our Alliance Agreement in which Howard will build and store at their facility in Laurel, Mississippi a six-week supply of transformers. These transformers are a combination of single-phase overhead, single-phase padmount and three-phase padmount types totaling 570 transformers.

Materials Management will work with Howard to rotate (turn) these transformers in the most cost effective manner acceptable to both parties, but Howard will always have the transformers available for immediate shipment. In the event that we need these transformers (storm or emergency), Howard will assign two drivers to a truck and they will take turns driving to ensure a 24-hour delivery from the time of our call.

In early spring of 2002, Materials Management will work with Howard to increase the number of transformers built and stored through the summer months to ensure an adequate stock in the event of a heat storm.

XI. EMPLOYEE TRAINING PROGRAMS

A. Time Merit Progression (TMP) Program

WMECO, along with NU, has developed a Time Merit Progression ("TMP") program for newly hired employees as well as employees who transfer into skilled positions within the Company. A copy of the TMP manual for a Lineworker is attached as Appendix VI. The program, which is monitored through the NU Training Department, tracks the progression of trainees in such skilled disciplines as Lineworker, Splicer, Electrician, Meter and Service Mechanic, Garage Mechanic, and other disciplines.

The intent of the WMECO TMP Program is to educate and mature an apprentice through a series of job tasks and testing under the direction of qualified trainers and mentors. The same amount of time is not required for everyone to develop the same job skills. However, in the TMP program structured training is delivered to introduce an apprentice to the majority of tasks needed to develop proficiencies in their trade. An apprentice is expected to gain an understanding of most of the tasks of the industry during his or her term of apprenticeship. The goal of the WMECO TMP program is to have a framework that ensures each apprentice is well trained in necessary job tasks to become a safe, productive, qualified employee.

The WMECO TMP program includes a series of steps with each step being six months long. The steps consist of not only formal training but also practical field experience that does not exceed the current level of the apprentice's knowledge and skill. It is necessary for the trainee to meet certain standards of performance before progressing to the next step by demonstrating practical skills and passing written tests.

B. Skills Enhancement and Recertification Training (SERT) Program

WMECO recognizes the need to keep employees in compliance with OSHA's annual training requirements. Along with satisfying our OSHA responsibilities, there is also a need to conduct training on any new equipment and technology in the electrical industry. To keep this training consistent in all areas of operation, WMECO, along with NU, developed the Skills Enhancement and Recertification Training ("SERT") program. This training has been conducted annually over the last decade and continues today.

WMECO's SERT training programs are two to four days long and are held annually. The purpose of conducting SERT for these disciplines locally is to address the electrical circuits and work practices specific to WMECO's service territory. SERT Training for these disciplines is normally held between the months of January and April prior to the construction season. There are also new vehicle, tool, and equipment training programs that are conducted throughout the course of the year on an as needed basis.

WMECO has assembled a team of management and bargaining unit employees that meets annually to set the agenda for the following year. The agenda is tailored to suit the requirements of each individual work function such as Lineworker, Splicer, Electrician, Meter and Service Mechanic, Stockhandler, Garage Mechanic, Technicians and Meter Readers. The topics for the agenda are selected on a priority basis with special attention given to OSHA-required training, safety, switching and tagging procedures, grounding for personal protection, medic first aid, hazard assessment, tailboard conferences, environmental issues, etc. A program evaluation sheet is filled out by each employee at the conclusion of his/her annual training, which gives them the opportunity to not only assess the program, but to also request whatever future training he/she feels is needed.

A list of some of the SERT topics from 2000 and 2001 is included as Appendix VII.

C. Switching & Tagging Training

All WMECO employees working with the electrical distribution plant are trained in the necessary switching and tagging procedures to safely create and maintain an electrical working clearance, similar to OSHA's Lock out / Tag out requirements. A working clearance gives permission for employees to safely work on various lines and equipment of the transmission and distribution plant. These employees received initial classroom and field training to be qualified for either the distribution system (via Northeast Utilities procedure TD 800), or the transmission system (via CONVEX procedure #6401), or both. The System Operations Center maintains copies of the qualified switchers for these procedures and retraining is completed every two years for TD 800 and every three years for CONVEX #6401. Only qualified employees, who have completed the necessary training, can switch

and tag these systems and receive a clearance to perform work on the T&D systems, respectively. Although the distribution system refresher training is completed in the WMECO SERT program, CONVEX Transmission training is separate and distinct.

D. Environmental Training

WMECO's policy dictates Compliance, Leadership, Accountability and Stewardship in the environmental arena. As such, we feel that all employees must be provided with environmental training. The level of training is determined by the potential exposure to environmental issues/hazards that an individual is likely to encounter while performing their job.

At the most basic level is training on ethics and decision making with regard to environmental situations, environmental management system, spill awareness and pollution prevention/waste minimization. All personnel receive this training.

The next level includes Materials of Trade which addresses particular items that are exempt from Department of Transportation rules for transporting hazardous materials on commercial vehicles, a discussion of hazardous wastes that we come across in our business, and Hazardous Waste Operations and Emergency Response training explaining what workers need to know when they witness a release. Meter readers, Meter Services, Overhead, Underground, Transportation and New Services receive this training. These are all field positions, personnel who may be needed to deal with a spill site while out performing their duties.

The final level includes training on the portions of the Resource Conservation and Recovery Act ("RCRA") that apply to our business. The focus of this portion of training is on weekly inspection of storage sites at our facilities. We store hazardous wastes such as fluorescent bulbs, batteries and aerosol cans. Linemen and Electricians receive this training.

The final segment of training is on Department of Transportation requirements for transporting hazardous materials. Electrical Maintenance personnel receive this training.

This training enables WMECO's employees to perform their jobs in accordance with the four tenets of our environmental policy, Compliance, Accountability, Leadership and Stewardship.

XII. STAFFING LEVELS FOR OPERATION, MAINTENANCE AND INSPECTION

WMECO has fully trained employees that can do all levels of operating, maintaining, and inspecting on our system. WMECO has found that it is best to have a fully trained employee that can do all of these functions. An employee that has to operate the equipment that they maintain or inspect is more apt to do a thorough inspection and complete maintenance than one that does not operate

the equipment. The WMECO staffing levels by District are included as Appendix VIII.

WMECO benefits from the flexibility of having fully trained employees. Inspections can be scheduled when other work is light. Also, fully trained employees that are scheduled to do inspection work can be redeployed for operating and restoring the system should an unexpected emergency occur during the day. At this time, with the current staffing levels, all required operations, maintenance, and inspections are being performed. WMECO currently has the best record in the NU system for SAIDI.

XIII. COST/BENEFIT OF DEDICATED INSPECTION PERSONNEL

WMECO follows the guidelines in the NUMP manual for inspecting, testing, and maintaining all major electrical equipment. The NUMP manual contains inspection, test, and maintenance schedules and guidelines.

The following is our assessment of the cost/benefit of adding dedicated inspection personnel to the WMECO workforce.

At this time, and with the current staffing levels, WMECO has the best SAIDI in the NU system and has had this level of performance for over five years. WMECO accomplishes this with employees who are capable of operating our system, doing maintenance work to all levels and inspections as required. This is cost effective for WMECO due to our size and amount of equipment to be maintained.

WMECO currently has programs in place that allows us to utilize workers from all Districts depending on the work load and staffing levels due to vacations, sickness, or training requirements.

If WMECO had employees dedicated to just inspection, it would require at a minimum five additional workers in the Overhead Line Department and five additional workers in the Electrical Maintenance Group due to the size of our service territory and the amount of equipment to be inspected. In the Underground Line Department we would need to add two UG employees for part of the year (three months). The inspection of underground facilities would not require extensive time as most of the equipment and plant is concentrated in the Springfield District.

Even though WMECO would train the dedicated inspection personnel to operate and maintain our distribution system, it would be difficult for these employees to keep an adequate skill level due to the lack of day-to-day operations and maintenance experience. Therefore, these 12 additional employees would not be available for emergency work which requires the ability to operate and repair the WMECO distribution system because their lack of experience raises safety concerns. WMECO cannot reduce its existing workforce any further due to the

need to have all of our fully trained workers available for emergency work both during the normal work day and after hours. This means that the dedicated inspection personnel would be additional employees added to WMECO's existing workforce.

As mentioned earlier in this report, these fully trained workers insure the equipment inspection is done with a knowledgeable worker that takes an interest in the reliable operation of the equipment.

The addition of 12 additional workers with equipment and trucks would cost WMECO over $1 million per year. This $1 million of additional costs will not produce an equivalent dollar value in reliability or productivity over what WMECO presently receives with the fully trained worker in WMECO.

XIV. TRANSMISSION ISSUES

A. Summer 2001 Analysis

While this report addresses the WMECO distribution system, an analysis of the WMECO transmission system was also performed. In general, the performance of the WMECO transmission system was adequate during the extreme weather of August 6 - 10, 2001. There were three areas of concern, one was a potential overload condition on an underground cable and the other two were potential low voltage conditions. Ongoing analysis throughout the heat wave and actions taken by operating personnel mitigated exposure from these concerns.

The full transmission report is included as Appendix IX.

B. Transmission System Infrastructure Improvements

The completion of the South Agawam substation targeted prior to the summer of 2002 will strengthen the Western Massachusetts transmission system. This substation will interconnect the Western Massachusetts 115kV transmission system with the Connecticut 115kV transmission system. In addition, the Berkshire Power Generating Facility will provide valuable voltage and thermal support.

Consolidated Edison Energy Massachusetts Inc. is presently repowering the West Springfield Units No. 1 and No. 2. The schedule indicates an in-service date for the summer of 2002. A contributing factor to the problems experienced in the Springfield area was the lack of West Springfield generation. These units reduce the probability of having to operate the system without West Springfield generation to support the area.

XV. APPENDICES

I. Outage Listing for 8/6/01 - 8/10/01
II. Load Forecast Results
III. NUMP Manual
IV. Worst Performing Equipment Report for 2000
V. Mobile Transformer List
VI. Lineworker TMP Manual
VII. SERT Topics 2000 & 2001
VIII. WMECO Staffing Levels
IX. Transmission Report